CLAIMS

1. Hydroxyapatite (HA) incorporating an alpha-emitting radionuclide chosen from the group ^{211}At, ^{212}Bi, ^{223}Ra, ^{224}Ra, ^{225}Ac, ^{227}Th or a beta-emitting radionuclide chosen from the group of ^{212}Pb, ^{211}Pb, ^{213}Bi or ^{225}Ra.

2. Hydroxyapatite according to claim 1 wherein the HA comprises a cation that is bivalent or trivalent or a mixture of such cations.

3. Hydroxyapatite according to claim 2 wherein the cation is chosen from the group consisting of calcium, strontium, barium, bismuth, yttrium, lanthanum, lead or mixtures thereof.

4. Hydroxyapatite according to any one of claims 1 to 3, wherein the HA is particulate and has a size in the range of 1 nm to 100 μm.

5. Hydroxyapatite according to claim 4 wherein the HA has a size in the range of 1 μm to 20 μm.

6. Hydroxyapatite according to any one of claims 1 to 5, wherein the HA is combined or co-sedimented with a substance selected from polylactide, polyethyleneketones, glass-ceramics, titania, alumina, zirconia, silica, polyethylene, epoxy, polyethyleneglycol, polyhydroxybutyrate, gelatin, collagen, chitosan, phosphazene, or mixtures thereof.

7. A process for preparing a radionuclide-labelled hydroxyapatite particulate, said process comprising:

(a) contacting a solution of an alpha-emitting radionuclide chosen from the group ^{211}At, ^{212}Bi, ^{223}Ra, ^{224}Ra, ^{225}Ac, ^{227}Th or a beta-emitting radionuclide chosen from the group of ^{212}Pb, ^{211}Pb, ^{213}Bi or ^{225}Ra with hydroxyapatite particulates not containing magnetic iron; and

(b) optionally crystallizing a coating of hydroxyapatite on the labelled particulates prepared in step (a) whereby to encapsulate said radionuclide or said *in* vivo generator in the particulate.

8. A process as claimed in claim 7 wherein step (a) is carried out at a pH in the range 3-12.

9. A process as claimed in claim 7 or claim 8 wherein said *in vivo* generator of an alpha-emitting radionuclide is ^{212}Pb and, prior to steps a) and b), said method additionally comprises;

i) Preparing ^{224}Ra,

ii) Purifying the ^{224}Ra by contact with an f-block specific binder ,

iii) Allowing ingrowth of ^{212}Pb, and

iv) Purifying the resulting ^{212}Pb by contact with a lead-specific binder

10. A pharmaceutical composition comprising a hydroxyapatite as claimed in any one of claims 1 to 6 and a physiologically acceptable carrier.

11. A pharmaceutical composition according to claim 10 in liquid, injectable form.

12. A pharmaceutical composition according to claim 10 in gel form.

13. Use of hydroxyapatite not containing magnetic iron (HA) and an alpha-emitting radionuclide chosen from the group ^{211}At, ^{212}Bi, ^{223}Ra, ^{224}Ra, ^{225}Ac, ^{227}Th or a beta-emitting radionuclide chosen from the group of ^{212}Pb, ^{211}Pb, ^{213}Bi or ^{225}Ra in the manufacture of a medicament for use in the treatment of a cancerous disease.

14. Use as claimed in claim 13 wherein said medicament is an injectable, infusable or locally applicable medicament.

15. Use as claimed in claim 14 wherein said treatment comprises intratumor therapy.

16. Use as claimed in claim 14 wherein said treatment comprises administration into the blood supply of a cancerous organ.

17. A device comprising hydroxyapatite incorporating an alpha-emitting radionuclide or an *in vivo* generator for an alpha-emitting radionuclide.

18. A method of radiochemical treatment of a human or non-human animal subject in need thereof, said method comprising administering to said subject an effective amount of a hydroxyapatite as claimed in any one of claims 1 to 6 or of a composition as claimed in any one of claims 10 to 12.

19. A method as claimed in claim 18 for the treatment of an intracavitary primary or metastatic tumor.

20. A method as claimed in claim 18 for intratumor therapy.

21. A method as claimed in claim 18 for anticancer therapy.

22. A method as claimed in claim 18 for anticancer treatment and/or sterilization of tumor bed and optionally the cavity in the case of an intracavitary tumor, wherein said administration is effected after surgical removal of at least part of a tumor.